

REMARKS

New claim 23 is supported by, for example, paragraph 19.

Claims 1-9, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama, U.S. Patent 4,012,833. Applicants respectfully traverse the rejection. Claim 1 is amended to recite "a substrate comprising a ceramic core and at least one copper layer overlying and in contact with the core." This amendment is supported by, for example, Figure 3 and accompanying text. In contrast to claim 1, Fig. 4B and column 3 line 60 to column 4 line 7 of Akiyama show an epoxy resin 33 disposed between black ceramic substrate 34 and copper marks 32' and copper layer 32.

It would not be obvious to remove the epoxy resin of Akiyama such that Akiyama's black ceramic substrate is in contact with copper marks 32', since resin 33 is used as a necessary adhesive to attach iron plate 31 to black ceramic substrate 34. Further, direct attachment of copper marks 32' to black ceramic substrate 34 would involve a process substantially more complicated and costly than the use of epoxy resin, contrary to the purpose of Akiyama stated at column 1 lines 31-33, "to provide a novel method of making a display device which is easy to manufacture and low in cost." Since Akiyama makes no mention of using high power LEDs, the device of Akiyama would not benefit from the improved thermal conductivity provided by putting black ceramic substrate 34 in contact with copper marks 32', thus there would be no reason for Akiyama to tolerate the increased complexity and cost of such a design, as such a complex and costly design would be contrary to Akiyama's object of low cost and ease of manufacture.

Further, Applicants respectfully submit that it would not be obvious to modify the thickness of the copper layers on Akiyama's device. The Examiner states "Although, Akiyama does not disclose the copper layer having a thickness of at least 4 mils, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the

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2033 N. FIRST ST.
SUITE 225
SAN JOSE, CA 95134
(408) 282-0480
FAX (408) 382-0481

adjustment regarding the thickness of the layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art." Applicants respectfully disagree. First, Applicants have found no teaching in Akiyama that recognizes the thickness of the copper in copper marks 32' and copper layer 32 as a result-effective variable. Applicants respectfully request that the Examiner point to a passage in Akiyama that teaches as much. Second, Akiyama's design requires that portions of layer 32 be formed into "comb-like electrodes each being substantially 0.5 mm in pitch, 100 μ in width, and 225 μ in length." See column 3 line 68 to column 4 line 2. These electrodes seem to be formed by photolithography: see column 3, lines 64-66 which refer to a "photo resist being used as a mask to form a copper layer 32 and copper marks 32' in predetermined patterns." Forming such features on thicker copper layers that are 4 mils thick would be difficult, given the tolerances of photolithography. As the thickness of the copper increases, the problem gets worse. Accordingly, there is no expectation that modifying Akiyama's copper layers to be thicker would be successful.

For the above reasons, claim 1 is allowable over Akiyama.

Claims 2-9, 16, and 17 depend from claim 1 and are therefore allowable over Akiyama for at least the same reasons.

Claims 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama as applied to claim 1, and further in view of Raj et al., U.S. patent publication 2002/0175339. The Examiner states "Akiyama substantially discloses the limitations in the claim . . . except for a second substrate layer between the copper substrate and the light emitting device. Raj discloses a transceiver in figure 4; wherein light emitting devices 110 are mounted on a substrate 106. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use another substrate along with the corresponding light emitting

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SAN JOSE, CA 95134
(408) 352-0480
FAX (408) 352-0481

devices on that substrate on the copper substrate of the Akiyama's structure in order to utilize the structure in applications such as fiber optics, as Raj reference discloses."

Applicants respectfully traverse the rejection. Claims 10-15 depend from claim 1. Raj adds nothing to the deficiencies of Akiyama with respect to claim 1, thus claims 10-15 are allowable over Raj and Akiyama for at least the same reasons claim 1 is allowable over Akiyama. In addition, the Examiner has provided no reason to modify either Akiyama or Raj to include two substrates. Applicants respectfully request that the Examiner clarify why a person of skill in the art would be motivated to use Raj's substrate 106 *in addition to* Akiyama's structure. Applicants fail to understand why a second, additional substrate would be required to, as the Examiner claims, "utilize [Akiyama's] structure in applications such as fiber optics."

In view of the above arguments, Applicants respectfully request allowance of claims 1-17 and 23. Should the Examiner have any questions, the Examiner is invited to call the undersigned at (408) 382-0480.

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Respectfully submitted,

R. Leiteman

Rachel V. Leiteman
Attorney for Applicants
Reg. No. 46,868

PATENT LAW
GROUP LLP
2635 N. FIRST ST.
SUITE 223
SAN JOSE, CA 95134
(408) 382-0480
FAX (408) 382-0481